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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,188	06/27/2001	Bhanwar Singh	F0654	3906

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EXAMINER	
UMEZ ERONINI, LYNETTE T	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 02/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/893,188	SINGH ET AL.	
	Examiner	Art Unit	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This communication is in response to Applicants' Amendment (filed March 1, 2004), which was inadvertently abandoned for failure to timely file a proper reply to the Office letter mailed on 19 May 2003. Applicants submitted evidence that a response was filed timely by providing a copy of the Auto-Reply Facsimile Transmission, which indicated the Reply was faxed and a return Auto-Reply Facsimile Transmission, which indicated the Reply was received by the USPTO on August 19, 2003, as. Hence, the abandonment is withdrawn.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4, 5, 6, and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Bartha et al. (US 5,635,337).

Bartha teaches, " . . . a method for producing a structure with more than two steps (multi-step structure) and ". . . such multi-step structures are formed inter alia in wiring planes of semiconductor chips and in the thin-film wiring of multilayer ceramic substrates . . ." (column 3, lines 46-49). "The substrate **1** . . . may consist of organic or inorganic material . . ." (column 3, lines 58-64) and the substrate may be " . . . for example, a dielectric substrate **1** . . ." (column 3, lines 49-51). Bartha further teaches,

"The method for producing a substrate with a multi-step structure, comprising the steps:

producing a substrate;

depositing a first photoresist layer on top of the substrate;

forming a first opening in the photoresist layer;

depositing a further photoresist layer on top of the first photoresist layer;

forming a further opening in the further photoresist layer, which is larger, and overlays all of the opening in the first photoresist layer to build a multi-step opening structure in multiple photoresist layers;

then transferring the multi-step opening structure of the photoresist layers into the substrate to produce a similar multi-step opening structure in the substrate; and

in which the structure is transferred by simultaneously etching both the substrate and the previous photoresist layer to form the multi-step opening structure (claim 2).

Bartha also teaches, " . . . the invention comprising the steps of: . . . c) forming a first opening (**4**) in the first photoresist layer (**2**) by exposure through a first mask (**3**), development and post baking of the first photoresist layer (**2**); . . . (column 1, lines 55 - 64), which reads on applicants' curing step below.

The above reads on,

A method for making a dual damascene pattern in a single etch process comprising:

providing a wafer having at least one insulative layer formed thereon:

depositing a first photoresist layer over the at least one insulative layer;

patterning a first image into the first photoresist layer;

curing the first patterned photoresist layer;

depositing a second photoresist layer over the first patterned photoresist layer;

patterning a second image into the second photoresist layer; and

etching the at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer simultaneously in the single etch process, wherein the first image and the second image are substantially formed in the at least one insulative layer, **as in claim 1**; and

wherein etching the at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer further comprises employing an etch chemistry that ablates an amount of the first patterned photoresist layer during the etching process without substantially affecting the second patterned photoresist layer, **as in claim 4**.

Since Bartha uses the same etching method in etching the same materials as that of the claimed invention, then using Bartha's etching method would inherently result wherein the etch chemistry is highly selective to the first patterned photoresist layer and to the at least one insulative layer than to the second patterned photoresist layer, **as in claim 5**.

Bartha also teaches, " . . . removing the first photoresist layer **(2)** which it is not covered by the overlying second photoresist layer **(5)** and simultaneously removing the top-most photoresist layer **(5)**" (column 2, lines 6-9 and 34-37), which reads on,

removing the first patterned photoresist layer and the second patterned photoresist layer, **in claim 6**.

Bartha further teaches, "For multilayer ceramic substrates, a conventional positive working photoresist is employed, . . ." (column 4, lines18-19), which reads on,

wherein the first patterned photoresist layer is a positive tone photoresist layer, **as in claim 7**.

Since Bartha uses the same method of using a single etchant in etching the same material through the same types of photoresist as claimed in the present invention, then using Bartha's etching method would etch at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer comprises employing an etch chemistry that would inherently ablate an amount of the first patterned photoresist layer during the etching process without substantially affecting the second patterned photoresist layer, as in **claim 4**; and would result wherein the etch chemistry is highly selective to the first patterned photoresist layer and to the at least one insulative layer than to the second patterned photoresist layer, as **in claim 5**.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartha ('337) as applied to claim 1 above, and further in view of Chang (US 4,165,395).

Bartha differs in failing to teach irradiating the first patterned photoresist layer with ultraviolet light, **in claims 2 and 3**.

Chang teaches. " . . . said first resist is exposed to actinic radiation in the 2Å to 5000Å range . . ." (claim 4) and "It has been found that . . . ultraviolet radiation exposure of the lower resist yields a very low amount of scattering to provide a very high aspect ratio (column 5, lines 22-24) which reads on irradiating a first patterned photoresist layer with ultraviolet light.

Since Chang illustrates exposing a photoresist to UV radiation is known and since Chang uses the same method of exposing the same material to UV radiation as claimed by applicants, then using Chang method in the same manner as claimed by applicant would result the same in curing the patterned photoresist layer comprises irradiating the first patterned photoresist layer with ultraviolet light. Hence, it would have been obvious

to one having ordinary skill in the art at the time of the claimed invention to modify Bartha by irradiating a photoresist with UV light as taught by Chang for the purpose of providing a resist having a very low amount of scattering to provide a very high aspect ratio (Chang, column 5, lines 22-24).

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bartha ('337) as applied to claim 1 above, and further in view of Dai (US 5,877,076).

Bartha differs in failing to teach the second patterned photoresist layer is a negative tone photoresist layer.

Dai teaches, " . . . forming dual damascene interconnections in semiconductor chips through the use of opposite type two-layered photoresist process. A silicon substrate is provided having a composite layer comprising a first layer of dielectric . . . Then, a layer of positive (P-type) chemical amplification resist (CAR) is deposited over the composite dielectric layer. . . . An opposite polarity, namely, a negative (N-type) CAR is next formed over the opposite P-type resist, and hole patterned through a clear field mask" (Abstract).

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Bartha by using a second patterned photoresist that is a negative tone photoresist layer for the purpose simplifying the state of known art of forming dual damascene structures (Dai, column 1, lines 30-33).

7. Claims 9, 10, 11, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartha ('337) in view Chang (US 4,165,395).

Bartha teaches, " . . . a method for producing a structure with more than two steps (multi-step structure) and " . . . such multi-step structures are formed inter alia in wiring planes of semiconductor chips and in the thin-film wiring of multilayer ceramic substrates . . ." (column 3, lines 46-49). "The substrate **1** . . . may consist of organic or inorganic material . . ." (column 3, lines 58-64) and the substrate may be " . . . for example, a dielectric substrate **1** . . ." (column 3, lines 49-51). Bartha further teaches, "The method for producing a substrate with a multi-step structure, comprising the steps:

producing a substrate;

depositing a first photoresist layer on top of the substrate;

forming a first opening in the photoresist layer;

depositing a further photoresist layer on top of the first photoresist layer;

forming a further opening in the further photoresist layer, which is larger, and overlays all of the opening in the first photoresist layer to build a multi-step opening structure in multiple photoresist layers;

then transferring the multi-step opening structure of the photoresist layers into the substrate to produce a similar multi-step opening structure in the substrate; and

in which the structure is transferred by simultaneously etching both the substrate and the previous photoresist layer to form the multi-step opening structure (claim 2).

The aforementioned reads on,

A method for making a dual damascene pattern using a dual layer patterning scheme and a single etch process comprising:

providing a wafer having at least one insulative layer formed thereon:

depositing a first photoresist layer over the at least one insulative layer;

patterning a first image into the first photoresist layer;

depositing a second photoresist layer on the first patterned photoresist layer;

patterning a second image into the second photoresist layer; and

etching the at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer simultaneously in the single etch process, wherein the first image and the second image are substantially formed in the at least one insulative layer, **as in claim 9**.

Bartha also teaches, " . . . removing the first photoresist layer **(2)** which it is not covered by the overlying second photoresist layer **(5)** and simultaneously removing the top-most photoresist layer **(5)**" (column 2, lines 6-9 and 34-37), which reads on,

removing the first patterned photoresist layer and the second patterned photoresist layer, **in claim 9**.

Bartha differs in failing to teach irradiating the first patterned photoresist layer with ultraviolet light to stabilize the first patterned photoresist layer, in **claim 9**; and

wherein etching the at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer further comprises

employing an etch chemistry that ablates an amount of the first patterned photoresist layer during the etching process without substantially affecting the second patterned photoresist layer, **in claim 10**.

Chang teaches. " . . . said first resist is exposed to actinic radiation in the 2Å to 5000Å range . . ." (claim 4) and "It has been found that . . . ultraviolet radiation exposure of the lower resist yields a very low amount of scattering to provide a very high aspect ratio (column 5, lines 22-24) which reads on irradiating a first patterned photoresist layer with ultraviolet light. Since Chang irradiates a photoresist with UV light as is claimed in the present invention, the using Chang method of irradiating a photoresist would result wherein irradiating the first patterned photoresist layer with ultraviolet light is for a time and at an energy dose sufficient to make the first patterned photoresist chemically resistant to organic solvents and developers, as **in claim 10**.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Bartha by irradiating a photoresist with UV light as taught by Chang for the purpose of providing a resist having a very low amount of scattering to provide a very high aspect ratio (Chang, column 5, lines 22-24).

Bartha further teaches, "For multilayer ceramic substrates, a conventional positive working photoresist is employed, . . ." (column 4, lines18-19), which reads on,

wherein the first patterned photoresist layer is a positive tone photoresist layer, **as in claim 13**.

Since Bartha uses the same method of using a single etchant in etching the same material through the same types of photoresists as claimed in the present invention, then using Dai's method of etching would result wherein at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer comprises employing an etch chemistry that would ablate an amount of the first patterned photoresist layer during the etching process without substantially affecting the second patterned photoresist layer, as in **claim 11**; and

wherein the etch chemistry is highly selective to the first patterned photoresist layer and to the at least one insulative layer than to the second patterned photoresist layer, **as in claim 12**.

8. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bartha ('337) in view of Chang ('395) as applied to claim 9 above, and further in view of Dai ('076).

Bartha differs in failing to teach the second patterned photoresist layer is a negative tone photoresist layer.

Dai teaches, "A method is disclosed for forming dual damascene interconnections in semiconductor chips through the use of opposite type two-layered photoresist process. A silicon substrate is provided having a composite layer. . . Then, a layer of positive (P-type) chemical amplification resist (CAR) is deposited over the composite dielectric layer. . . . An opposite polarity, namely, a negative (N-type) CAR

is next formed over the opposite P-type resist, and hole patterned through a clear field mask" (Abstract).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Bartha in view of Chang by using a second patterned photoresist that is a negative tone photoresist layer as taught by Dai for the purpose simplifying the state of known art of forming dual damascene structures (Dai, column 1, lines 30-33).

9. Claims 15, 16, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartha ('337) in view of Chang ('395).

Bartha teaches, " . . . a method for producing a structure with more than two steps (multi-step structure) and " . . . such multi-step structures are formed inter alia in wiring planes of semiconductor chips and in the thin-film wiring of multilayer ceramic substrates . . ." (column 3, lines 46-49). "The substrate **1** . . . may consist of organic or inorganic material . . ." (column 3, lines 58-64) and the substrate may be " . . . for example, a dielectric substrate **1** . . ." (column 3, lines 49-51). Bartha further teaches, "For multilayer ceramic substrates, a conventional positive working photoresist is employed, . . ." (column 4, lines18-19) and " . . . removing the first photoresist layer **(2)** which it is not covered by the overlying second photoresist layer **(5)** and simultaneously removing the top-most photoresist layer **(5)**" (column 2, lines 6-9 and 34-37). Bartha also teaches,

"The method for producing a substrate with a multi-step structure, comprising the steps:

producing a substrate;

depositing a first photoresist layer on top of the substrate;

forming a first opening in the photoresist layer;

depositing a further photoresist layer on top of the first photoresist layer;

forming a further opening in the further photoresist layer that is larger and overlays all of the opening in the first photoresist layer to build a multi-step opening structure in multiple photoresist layers;

then transferring the multi-step opening structure of the photoresist layers into the substrate to produce a similar multi-step opening structure in the substrate; and

in which the structure is transferred by simultaneously etching both the substrate and the previous photoresist layer to form the multi-step opening structure (claim 2).

The above aforementioned reads on,

A method for making a dual damascene pattern using a dual layer patterning scheme comprising:

providing a wafer having at least one insulative layer formed thereon:

depositing a positive tone photoresist layer over the at least one insulative layer;

patterning a first image into the positive tone photoresist layer;

depositing a second photoresist layer over the first patterned photoresist layer;

patterning a second image into the second photoresist layer;

etching the at least one insulative layer through the first patterned photoresist layer and the second patterned photoresist layer simultaneously in the single etch process, wherein the first image and the second image are substantially formed in the at least one insulative layer, **and**

removing the patterned positive tone, **as in claim 15**;

Bartha in view of Chang differs in failing to teach irradiating selected portions of the positive tone photoresist through a mask to effect an image-wise pattern transfer, wherein the irradiated portions of the positive tone photoresist layer are removed; polymerizing the first patterned photoresist layer using ultraviolet light radiation; irradiating selected portions of the negative tone photoresist through a mask to effect an image-wise pattern transfer, wherein the non-irradiated portions of the negative tone photoresist layer are removed; and removing the patterned positive and the patterned negative tone photoresist layers, **in claim 15**; and wherein the polymerized portions of the positive tone photoresist layer are chemically resistant to standard developer solutions and organic solvents, **in claim 16**.

Chang teaches. " . . . said first resist is exposed to actinic radiation in the 2Å to 5000Å range . . ." (claim 4) and "It has been found that . . . ultraviolet radiation exposure of the lower resist yields a very low amount of scattering to provide a very high aspect ratio (column 5, lines 22-24) which reads on irradiating selected portions of the positive tone photoresist layer through a mask to effect an image-wise pattern transfer, wherein the irradiated portions of the positive tone photoresist layer are removed. Since Chang irradiates a photoresist with UV light as claimed in the present invention, then using

Chang's method of irradiating a photoresist would result in polymerizing the first patterned photoresist layer using ultraviolet light radiation and wherein the polymerized portions of the positive tone photoresist layer are chemically resistant to standard developer solutions and organic solvents, as in the present invention.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Bartha by irradiating a photoresist with UV light as taught by Chang for the purpose of providing a resist having a very low amount of scattering to provide a very high aspect ratio (Chang, column 5, lines 22-24).

Bartha in view of Chang differs in failing to teach removing the patterned positive tone and the patterned negative tone photoresist layers, **in claim 15**.

Dai teaches, "The next layer (**160**) is a negative N-type photoresist which is next formed over the previous, and of opposite polarity, P-type CAR (**150**) as shown in FIG. 3d " (column 6, lines 55-57) and removing said layers of photoresist (Claim 1).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Bartha in view of Chang by using Dai's method of removing the photoresist for the purpose of preventing structural defect from unwanted etched residues.

Bartha in view of Chang and Dai differs in failing to teach wherein etching the at least one insulative layer through the patterned negative tone photoresist layer and the second patterned photoresist layer further comprises employing an etch chemistry that

ablates a predetermined amount of the patterned positive tone photoresist layer during the etching process without substantially affecting the patterned negative tone photoresist layer, **in claim 17** and wherein the etch chemistry is highly selective to the first patterned photoresist layer and to the at least one insulative layer than to the second patterned photoresist layer, as **in claim 18**.

It is the examiner's position that the combination of Bartha's method of forming a multilayer structure, Chang's method of irradiating a photoresist with UV light, and Dai's method of forming a negative photoresist over a positive photoresist would have been obvious to one having ordinary skill in the art at the time of the claimed invention for the purpose of minimizing the steps in making a dual damascene structure.

Response to Arguments

10. Applicant's arguments filed 3/1/2004 have been fully considered but they are not persuasive. Applicants traverse the rejection of claims 1 and 4-7 under 102(b) as being anticipated by Bartha (US 5,635,337) for failing to teach curing the lower photoresist layer. Applicants argument is unpersuasive because Bartha discloses " . . .forming a first opening (**4**) in the first photoresist layer (**2**) by exposure through a first mask (**3**), development and post baking of the first photoresist layer (**2**); . . . (column 1, lines 55 – 64), which reads on applicants' curing step.

Applicants traverse the rejection of claims 2-3 as applied to claim 1 and claims 9-13, under 103(a) as being unpatentable over Bartha (US '337) in view of Chang (US 4,165,395). Applicants' argue Chang fails to cure Bartha's deficiencies of curing the first

patterned photoresist layer comprises irradiating the first patterned photoresist layer with ultraviolet light and irradiating the first patterned photoresist layer with ultraviolet light to stabilize the first patterned photoresist layer, in claim 9 . Applicants' argument is unpersuasive because Chang teaches, exposing ultraviolet radiation to a lower resist yields a very low amount of scattering to provide a very high aspect ratio (column, line 22-24), which reads on irradiating a first patterned photoresist layer with ultraviolet light. Since Chang uses the same method of applying UV radiation to the same material as claimed by applicant, then using Chang' method in the same manner as claimed by applicants would result the same in curing the first patterned photoresist layer comprises irradiating the first patterned photoresist layer with ultraviolet light as well as irradiating the first patterned photoresist layer with ultraviolet light to stabilize the first patterned photoresist layer.

Applicants also argue Chang fails to provide the requisite motivation to modify Bartha in order to perform the subject invention.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation for

the rejection is for the purpose of providing a resist having a very low amount of scattering to provide a very high aspect ratio (Chang, column 5, lines 22-24).

Applicants traverse the 103(a) rejection of claim 14 as applied to claim 9 under 103(a) as being unpatentable over Bartha ('337) in view of Chang ('395) and further in view of Dai ('076). Applicants argue Dai fails to cure the Bartha's and Chang's deficiencies of irradiating the first patterned photoresist layer with ultraviolet light to stabilize the first patterned photoresist layer. Applicants' argument is unpersuasive because Dai is relied upon the second patterned photoresist layer is a negative tone photoresist layer.

Applicants traverse the rejection of claims 15-18 under 103(a) over Bartha ('337) in view of Chang ('395) and Dai ('076). Applicants argue Dai fails to cure Bartha's and Chang's deficiencies of in failing to teach wherein etching the at least one insulative layer through the patterned negative tone photoresist layer and the second patterned photoresist layer further comprises employing an etch chemistry that ablates a predetermined amount of the patterned positive tone photoresist layer during the etching process without substantially affecting the patterned negative tone photoresist layer, **in claim 17** and wherein the etch chemistry is highly selective to the first patterned photoresist layer and to the at least one insulative layer than to the second patterned photoresist layer, as **in claim 18**. Applicants' argument is unpersuasive because the combination of Bartha's method of forming a multilayer structure, Chang's method of irradiating a photoresist with UV light, and Dai's method of forming a negative

photoresist over a positive photoresist would have been obvious to one having ordinary skill in the art at the time of the claimed invention for the purpose of minimizing the steps in making a dual damascene structure.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references:

Furihata et al. (US 6,221,989), on column 7, lines 62-65 and

Yang US (6,218,082), on column 2, lines 39-40 are relied upon to illustrate curing a photoresist by baking.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit 1765

SHAMIM AHMED
PRIMARY EXAMINER

ltue

February 15, 2006